

A person with long brown hair, wearing a blue jacket, is seen from the side, aiming a rifle. The background is a blurred outdoor setting with green foliage and a brick building. A target with a bullseye is visible on the right side of the image.

AIRCARTRIDGE TECHNOLOGY

By

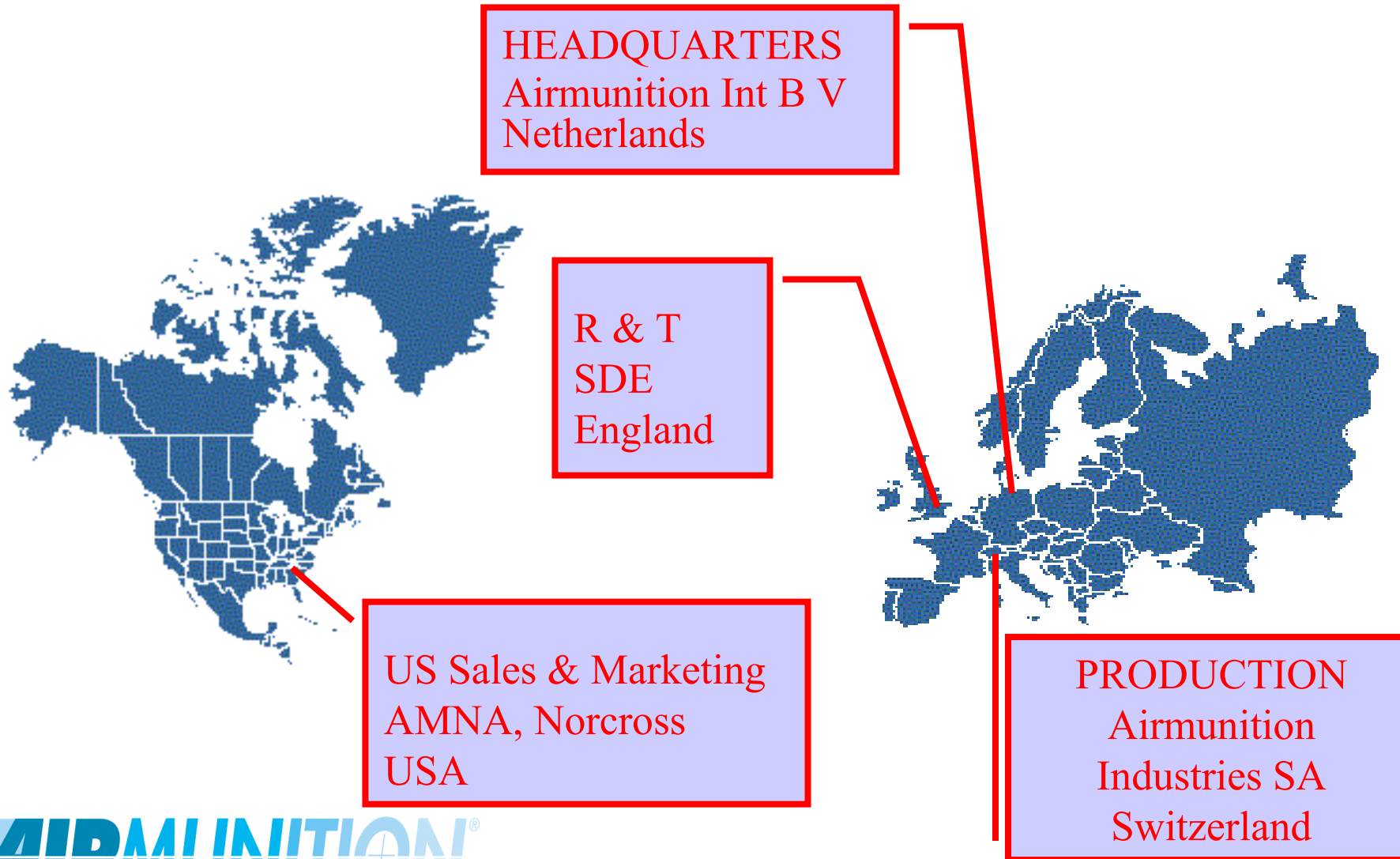
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- Who are we & where are we based?
- Airmunition concept.
- Product range & benefits.
- Energy comparison.
- AirCartridge technology & kinematic model.
 - Methodology.
 - Trials.
 - Results & Validation.
- System Modelling.
- Conclusions.

Organisation

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Mission



To provide **safe, realistic & cost effective** weapon training systems, using the patented concept of compressed air as an energy source.



37mm aircartridges, .38 Special and 9mm Recoil cartridges; multipurpose pellets and ManMarker Rounds.

The Concept

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Small Calibre

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Product Range

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Benefits



- **Cost Effective**
 - Each cartridge can be reloaded in excess of 500/2000 times.
- **Environmentally Friendly**
 - Uses only air.
 - Can be used indoors without a need for ventilation.
- **Safe**
 - No energetic materials are used.
 - Patented vent hole in the side of the chamber.
- **Reliable**
- **Variable Velocity**
 - For special applications, the muzzle velocity can be varied by varying the pressure.

Energy Comparison

9mm

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	Pyrotechnic Cartridge	AirCartridge
Maximum Pressure	3200 (bar) 46,400 (psi)	250 (bar) 3,625 (psi)
Total Energy (J)	1840	9
Muzzle Energy (J)	580	2.5

AirCartridge Technology

Objectives

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- To allow a wider application of the technology.
- To assist production by identifying critical areas of the design.
- To reduce development time and cost of future products.

- Produce a Kinematic Model of the AirCartridge.
- Conduct laboratory tests, to obtain pressure & time data within the AirCartridge, using both standard & non-standard components.
- Produce algorithms to predict the flow of air through the valves.
- Insert the data into the Kinematic Model.
- Validate the model.

Trial Programme

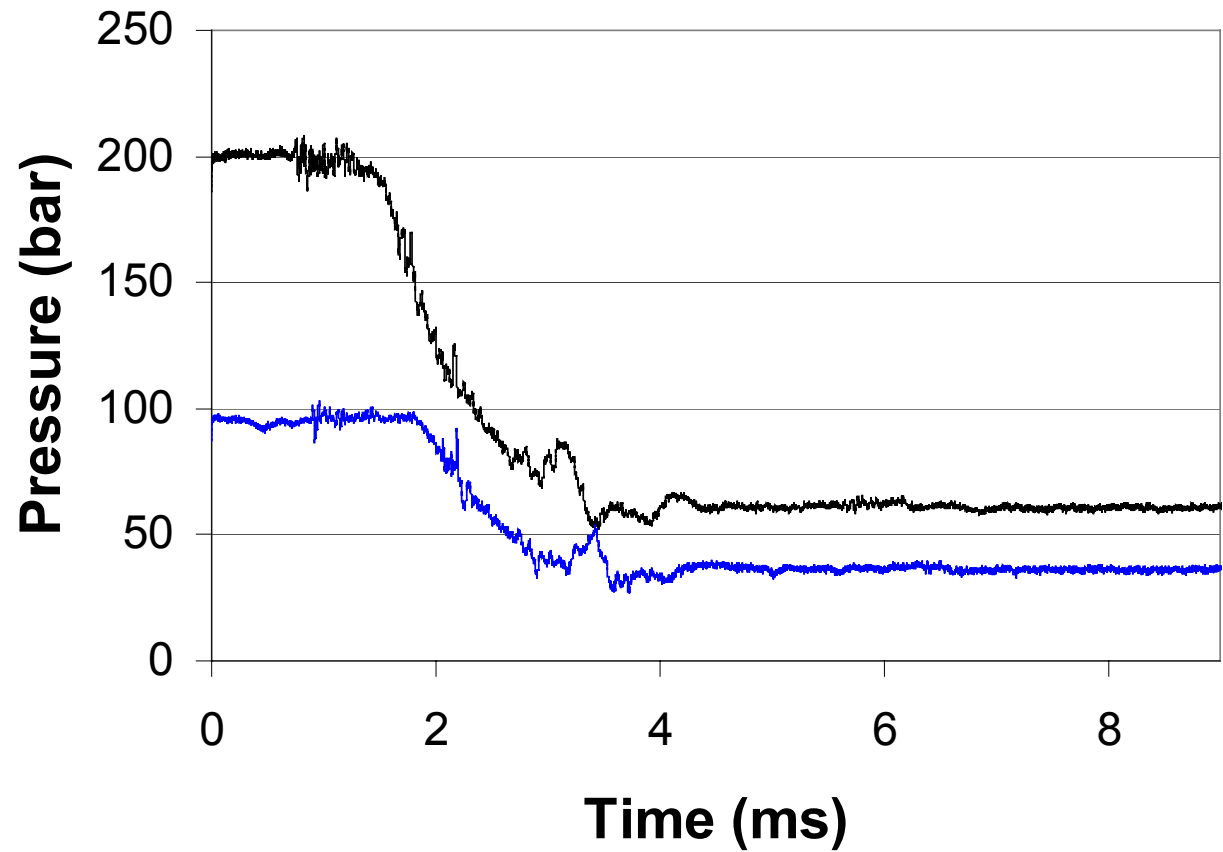


- **Build Standard Variations**
 - Piston (main) valve travel.
 - Flow restriction from main to rear chamber.

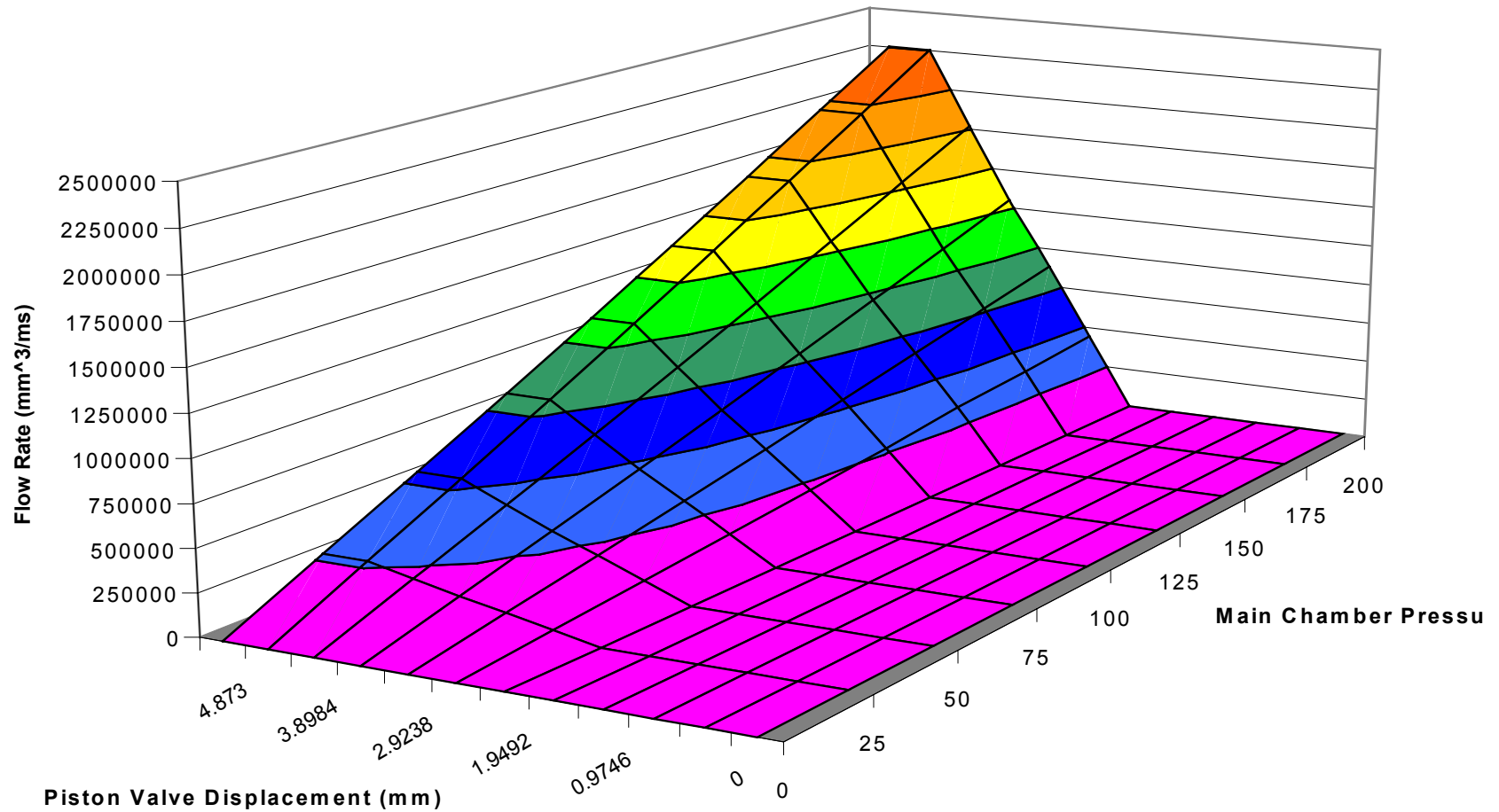
- **Initial Charge Pressure**
 - Pressures at 200 bar (2900 psi) & 100 bar (1450 psi).

- **Trials**
 - Determination of Spool Valve activation energy.
 - Record pressure/time data.

Trial Results



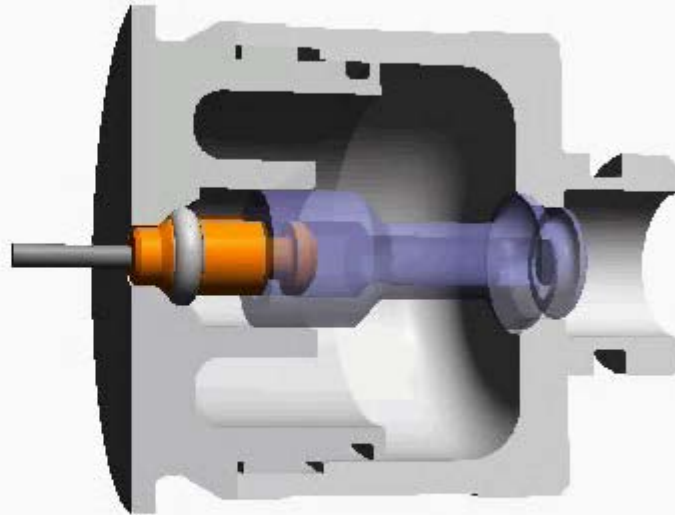
Air Flow Algorithms



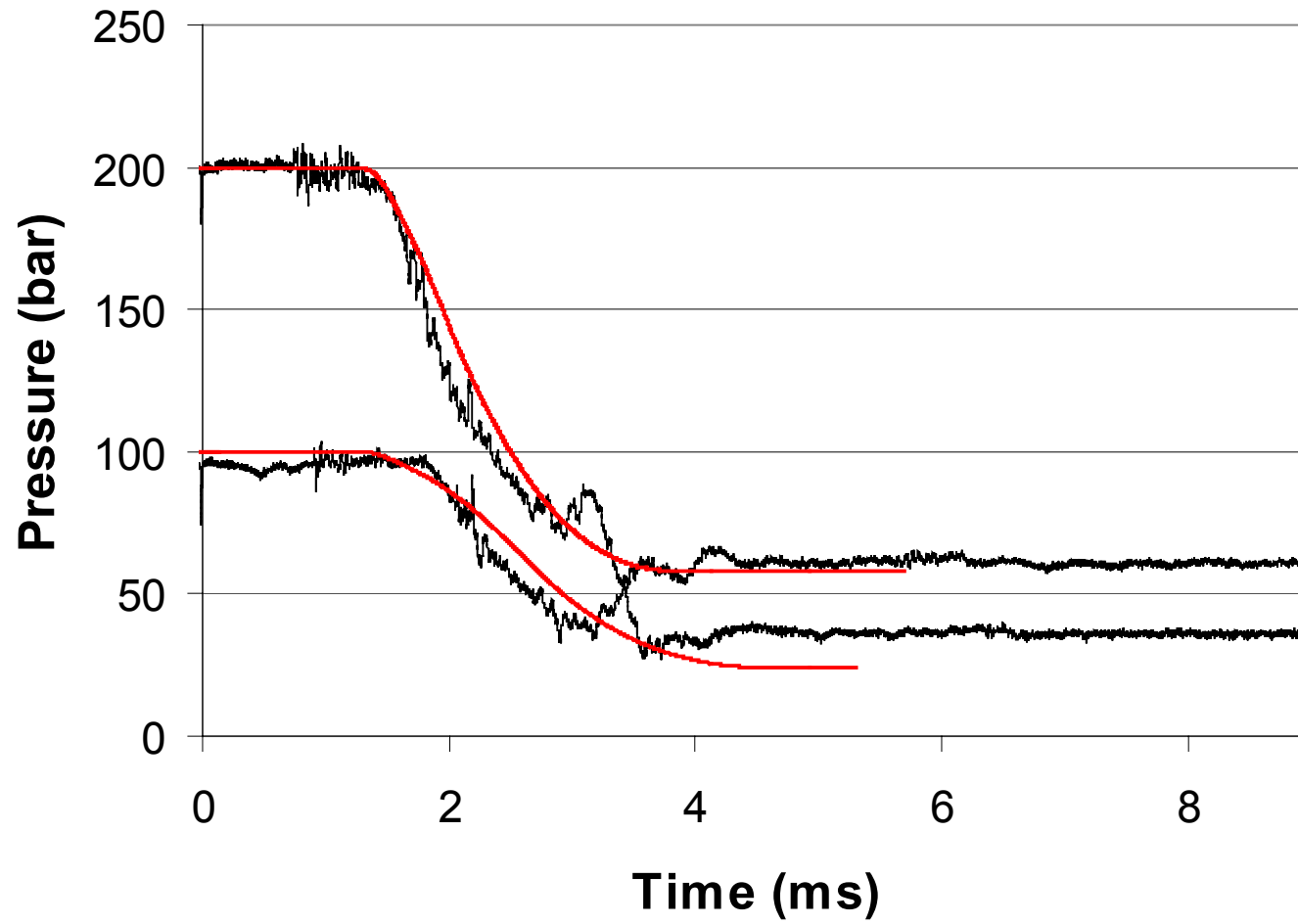
Model Results

Chamber Pressures

Prear Pmain vs. t (ms)



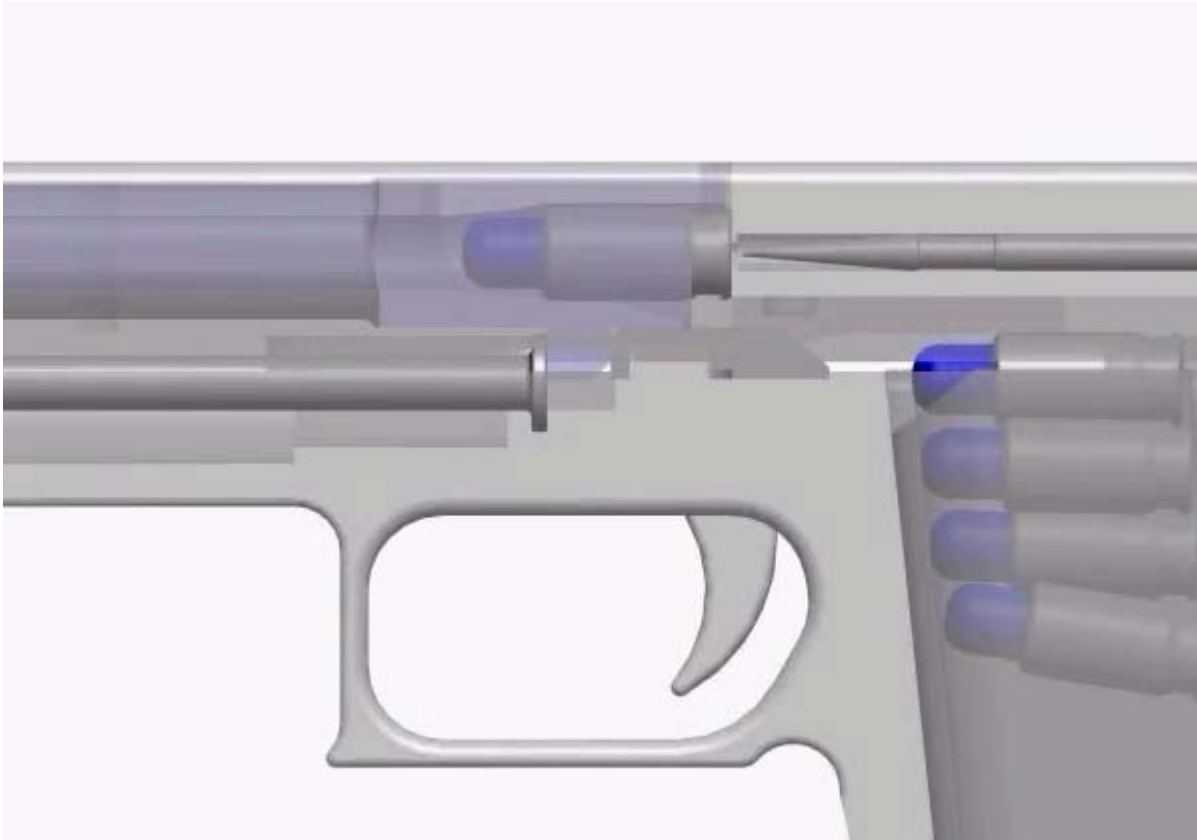
Model Results



System Modeling



System Modeling



Model Conclusions

- A Kinematic Model has been developed which accurately represents the action of the AirCartridge, which allows us to:
 - Identify & quantify critical design features.
 - Develop new products more efficiently.
- This model can be extended to include the complete weapon system, further reducing development time and costs.

QUESTIONS?

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